

**MEETING THE FOOD SUMMIT
TARGET THE UNITED STATES
CONTRIBUTION**

GLOBAL STRATEGY

September 1998

**APAP III
Research Report
No 1039**

Prepared for

Agricultural Policy Analysis Project, Phase III, (APAP III)

USAID Contract No LAG-C-00-93-00052-00

Authors	J Dirck Stryker Jeffrey C Metzel
Assisted by	Ndaya Belchika-St Juste Selma Pandolfi B Lynn Salinger Associates for International Resources and Development



AGRICULTURAL POLICY ANALYSIS PROJECT, PHASE III

Sponsored by the
U S Agency for International Development

Assisting USAID Bureaus Missions and Developing Country Governments to Improve Food & Agricultural Policies and Make Markets Work Better

Prime Contractor	Abt Associates Inc
Subcontractors	Development Alternatives Inc Food Research Institute, Stanford University Harvard Institute for International Development, Harvard University International Science and Technology Institute Purdue University Training Resources Group
Affiliates	Associates for International Resources and Development International Food Policy Research Institute University of Arizona

Project Office 4800 Montgomery Lane Suite 600 Bethesda, MD 20814 Telephone (301) 913 0050
Fax (301) 652 3839 Internet apap3@abtaassoc.com USAID Contract No LAG-4201 C 00-3052-00

B

MEETING THE FOOD SUMMIT TARGET THE UNITED STATES CONTRIBUTION

GLOBAL STRATEGY

prepared by

**J. Dirck Stryker
Jeffrey C. Metzel**

with the assistance of

**Ndaya Beltchika-St. Juste
Selina Pandolfi
B. Lynn Salinger**

Associates for International Resources and Development

September 1998

APAP III Research Report 1039

Agricultural Policy Project, Phase III (APAP III)
USAID Contract No. LAG-C-00-93-00052-00

Prepared for

**Office of Economic Growth and Agricultural Development
Global Bureau
U. S. Agency for International Development**

Views presented here do not necessarily reflect the official position of the U. S. Government

TABLE OF CONTENTS

PREFACE	1
SUMMARY	1
PREVALENCE OF UNDERNUTRITION	3
Current Level of Undernutrition 1990-1995 (Map 1)	4
Year 2015 Projection of Undernutrition (Map 2)	5
CAUSES OF UNDERNUTRITION	7
CONSEQUENCES AND OPPORTUNITIES	12
LEVELS AND COSTS OF INTERVENTION	14
WHAT WILL IT COST	15
U S COMPARATIVE ADVANTAGE	24
Most Productive Farmers in the World	24
NGO Experience in Food Aid Delivery and Community Participation	25
Leader in International Trade Negotiations	25
Worldwide Strategic Interests	25
Strong Private Sector	26
U S STRATEGY FOR MEETING THE FOOD SUMMIT TARGET	26
Global Interventions	26
National Interventions	27
Sectoral Interventions	27
Household Interventions	29
CONCLUSIONS	31
REFERENCES	32
 ANNEX A Food Security Model Description and Tables	
Agricultural Policy Analysis Project (APAP) Selected Publications	
 TABLES	
Table 1 Interventions to Reduce Undernutrition	14
Table 2 Impact of Interventions on Undernourished (Scenario 1 Equal Distribution)	17
Table 3 Cost Effectiveness of Interventions Reduction in Undernourished	18
Table 4 Impact of Interventions on Undernourished (Scenario 2 Least cost distribution)	20
Table 5 Impact of Interventions on Undernourished (Scenario 3 Rational distribution)	22
Table 5 Impact of Interventions of Undernourished (Scenario 4 Policy absent)	23

PREFACE

To make the commitment to end world hunger was a challenge set forth by the leaders of the world at the 1996 World Food Summit. As an intermediate goal, the summit put forward the objective to reduce the number of undernourished people in the world to 400 million by the year 2015.

Based on a challenge set forth by U.S. Agency for International Development (USAID) commissioned the Agricultural Policy Analysis Project, Phase III (APAP III) to develop an economic foundation and strategy for meeting the Food Summit target. Discussions of the undertaking began as part of the seminar on “Agricultural Policy Reform, Growth and Food Security: Preparing for the 21st Century” sponsored by USAID and organized by APAP III.

J. Dirck Stryker and Jeffery C. Metzger of APAP team member Associates for International Resources and Development (AIRD) provided leadership in undertaking the analysis, and preparing this strategy and the accompanying proposed initiative. They worked closely with Mark D. Newman, A. Ray Love, Gordon A. Straub and Wallace E. Tyner at Abt Associates, and consulted with a number of international experts from a variety of academic and research institutions. These experts included Michael Weber, Michigan State University; Terry Roe, University of Minnesota; Robert Paarlberg, Wellesly College; Peter Timmer, Harvard Institute for International Development; Kimberly Chung, Brown University; Per Pinstrup-Anderson, Mark Rosegrant, Peter Hazell, Phillip Pardey, Lawrence Haddad, and Lisa Smith, International Food Policy Research Institute; and Cheryl Christensen and Shahala Shapouri, Economic Research Service, USDA.

Preliminary findings were discussed and adapted in a series of focus groups organized by USAID with interested agencies in Washington, D.C., including the State Department, under the guidance of Food Security Coordinator, Lynn Lambert; USDA with input from “Buzz” Guroff, Mary Anne Keefe, and staff in the Economic Research Service; NOAA; and others. The primary conclusion from these discussions was that real progress in meeting the Food Summit objective will require an increased commitment of U.S. resources as well as close collaboration with other donors, financial institutions, private business and NGOs.

Based on feedback and further analysis, Dr. Stryker’s team worked with USAID officials to develop the following Global Strategy to achieve the Food Summit target and the accompanying Proposal for a Presidential Initiative.

Mark D. Newman, Technical Director
APAP III

Gordon A. Straub, Project Director
APAP III

SUMMARY

The World Food Summit in 1996 established the target of reducing by the year 2015 the number of undernourished people in the world to one-half the level that existed in the early 1990s.¹ In broad terms this means reducing the number of undernourished from in excess of 800 million to a target of 400 million. Although recent trends suggest that the percentage undernourished is currently falling in most areas of the world, the same cannot be said of the absolute level of undernourished unless there is an increased effort to achieve this target. Furthermore, even the percentage of undernourished is projected to rise in some countries, especially in Sub-Saharan Africa.

Within the United States, an Inter-Agency Working Group (IWG) was created after the Food Summit to prepare an Action Plan in support of the achievement of this target not only at the global level but also on the domestic front. In elaborating this plan, the IWG met with numerous organizations such as NGOs, private firms, universities, foundations, and government agencies at the federal, state, and local levels. The Action Plan that resulted has a number of key features.

- Emphasis on an open trade and investment policy environment, sound food security policies, and a participatory decision-making process – all seen as essential to stimulating the required foreign and domestic investment.
- Re-negotiation of the Food Aid Convention to establish acceptable and feasible food aid levels.
- Continued liberalization of world trade, including free trade in food and biotechnology products.
- Support for research, education, and extension related to agriculture and nutrition in the U.S. and overseas, with emphasis on production, processing, and marketing systems that are environmentally sustainable.
- Support for food safety nets through domestic food assistance and international food aid programs.
- Improvement of information systems designed to monitor food security.
- Enhanced food and water safety.
- Support for food security as a basic human right, though recognizing that this “need not lead to development of any additional legally binding international agreement.”

The plan recognizes the need for a differentiated approach by region, for taking advantage of the United States’ comparative advantage in certain types of assistance, for coordinating with other donors, and for prioritizing actions.

¹ This report concentrates on the problem of undernutrition resulting from lack of adequate absorption of calories by the human body, in contrast to malnutrition, which may be due to deficiencies of protein or micro-nutrients as well. Although the problem of micro-nutrient deficiency is severe in some parts of the world -- especially for vitamin A, iron, and iodine -- the solutions to this problem are quite different from those for overcoming calorie deficiency. Furthermore, the Food Summit target is defined solely in terms of calorie deficiency, so this seems the appropriate measure to be used here.

It soon became apparent, as the plan was being prepared, that additional budgetary resources were not going to be available for implementation of the plan. As a result, it has been constrained to describing how the United States intends to fulfill its commitments by strengthening what is already being done to reduce hunger and malnutrition at home and abroad *within the normal budgetary process*. This leaves room, however, for the proposal of a Presidential Initiative to seek additional resources.

Such an initiative requires an analysis of the prevalence and causes of world undernutrition, an assessment of alternative approaches for achieving the Food Summit target including their cost effectiveness in meeting this goal, an analysis of the comparative advantage of the U.S. over other donors in working towards the target, and the specification of a strategy for the U.S. to pursue. This is the subject of this report. The proposal for a Presidential Initiative will go beyond this to specify the specific elements of the U.S. strategy and what their costs will be, why the U.S. should undertake these actions rather than other donors, what the impact of these actions will be on undernutrition, and why the U.S. will benefit.

This report begins with an assessment of recent levels of undernutrition by major country and sub-region. It then projects to the year 2015 the number of undernourished in the world assuming no increase in the actions taken to reduce this number. These projections are based on forecasts of child malnutrition extrapolated to the entire population. The causes of undernutrition are then assessed for 14 major countries and sub-regions of the world, followed by a discussion of the consequences of world hunger for the international community, including the United States.

The report then goes on to examine the opportunity that currently exists for alleviating hunger and meeting the Food Summit target. Alternative interventions for achieving this goal are described and their cost effectiveness is estimated. The report concludes that the total cost of reaching the target could be less than \$45 billion. Stretched out over 15 years, this amounts to no more than 5 percent of the current annual level of Official Development Assistance.

The report goes on to look at the U.S. comparative advantage in reducing world hunger. This assessment is combined with the cost effectiveness analysis of alternative interventions to yield a U.S. strategy for meeting the Food Summit target -- a strategy in which the U.S. concentrates its interventions, beyond those already being undertaken, in South Asia and Sub-Saharan Africa.

The report concludes with the following observations:

- If no additional action is taken, world undernutrition is expected to increase in absolute terms by the year 2015.
- There is a unique opportunity for U.S. global leadership in meeting the Food Summit target at the turn of the millennium.
- A viable and affordable strategy exists for achieving this goal.
- This strategy draws upon the combined experience of U.S. farmers, agribusiness, NGOs, universities, foundations, and the U.S. government.

PREVALENCE OF UNDERNUTRITION

In the 1995, the number of undernourished in the world totaled about 854 million.² This figure is expected to increase to about 915 million by the year 2015 unless further action is taken. This does not imply that no progress is being made in reducing world hunger. In many areas of the world, the percentage undernourished is decreasing. This is not true everywhere, however, and even where it is true, growth of population often results in increased absolute numbers of undernourished.

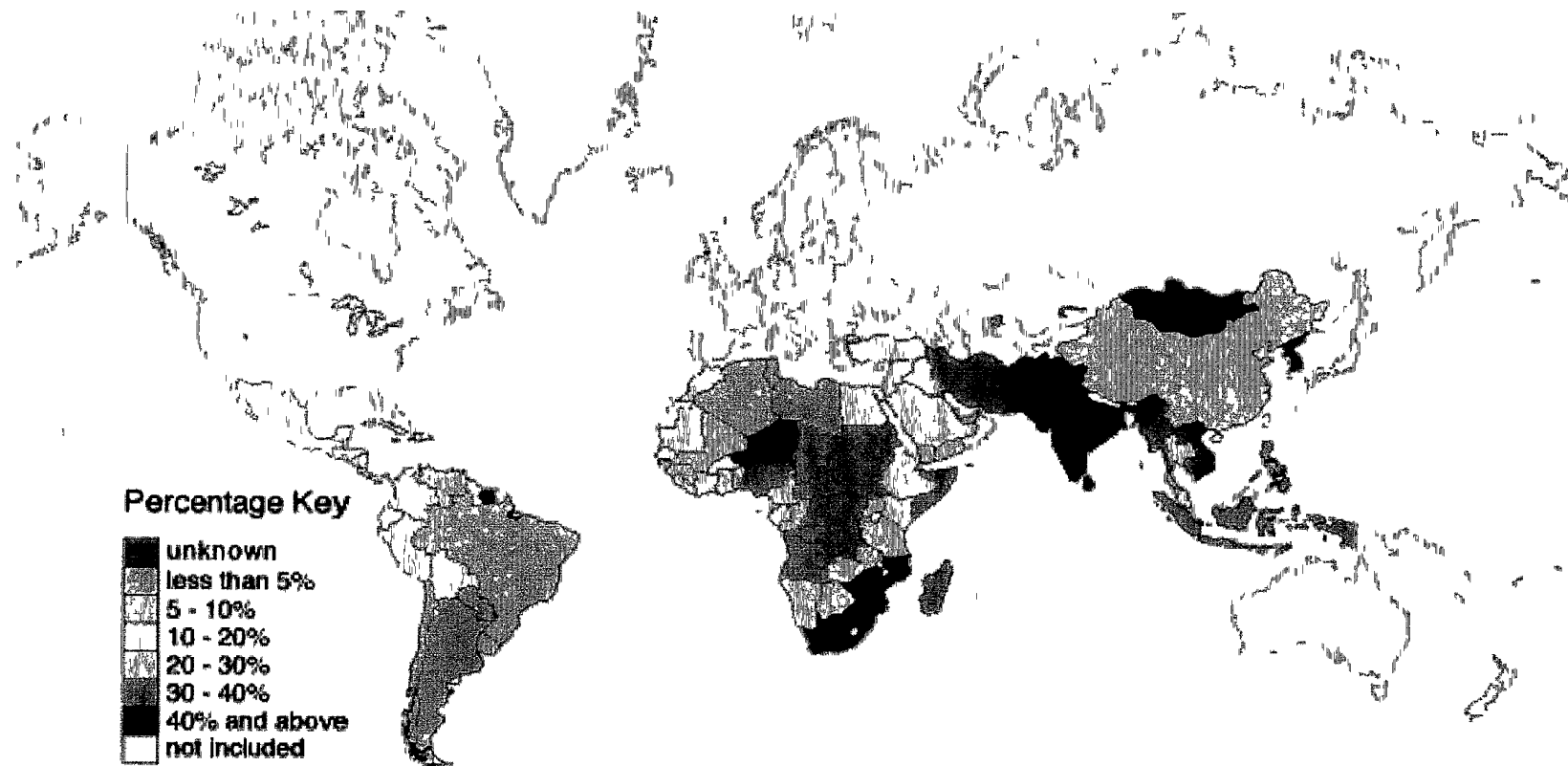
Particularly striking is the distribution of the percentage of undernourished across regions and countries, as shown in Map 1. These figures relate to data on child malnutrition, which better indicates physical status than do estimates of chronic undernutrition derived from data on food availability (see Footnote 2). They show high rates of undernutrition in Sub-Saharan Africa (SSA), South Asia, and some parts of Southeast Asia. Rates are relatively low, for the most part, in North Africa, South America, and the Middle East. They are somewhat higher in Central America and parts of the Caribbean.

Map 2 shows projected rates of child malnutrition by country in the year 2015. These projections are based on the equation used by the International Food Policy Research Institute (IFPRI) to project child malnutrition based on IFPRI's Vision 2020 projections of food availability. The projections of child malnutrition based on food availability have been modified to allow for estimated changes by the year 2015 in women's rates of secondary school enrollment and in the percentage of the population with access to safe water.

² This figure differs somewhat from the number estimated by FAO of 841 million undernourished in 1990-92. The FAO estimate is based on food availability calculated from food balance sheets with an adjustment for the distribution of food intake within countries. A minimum requirement is established for each country, and the percentage of the population falling below this requirement is considered chronically undernourished (FAO, 1996). In contrast, the number reported here is based on the percentage of children underweight in 1988-92 from Smith (1998), adjusted for population change to 1995 and extrapolated to cover the entire population (see Annex A for the methodology). Although the two numbers do not differ very much in total, the differences are much larger across regions. In particular, undernutrition is much greater in South Asia than would be predicted by the data on food availability. The FAO is well aware of this, having published child malnutrition data obtained from anthropometric surveys in addition to the estimates of chronic undernutrition from data on food availability (FAO, 1996).

Map 1

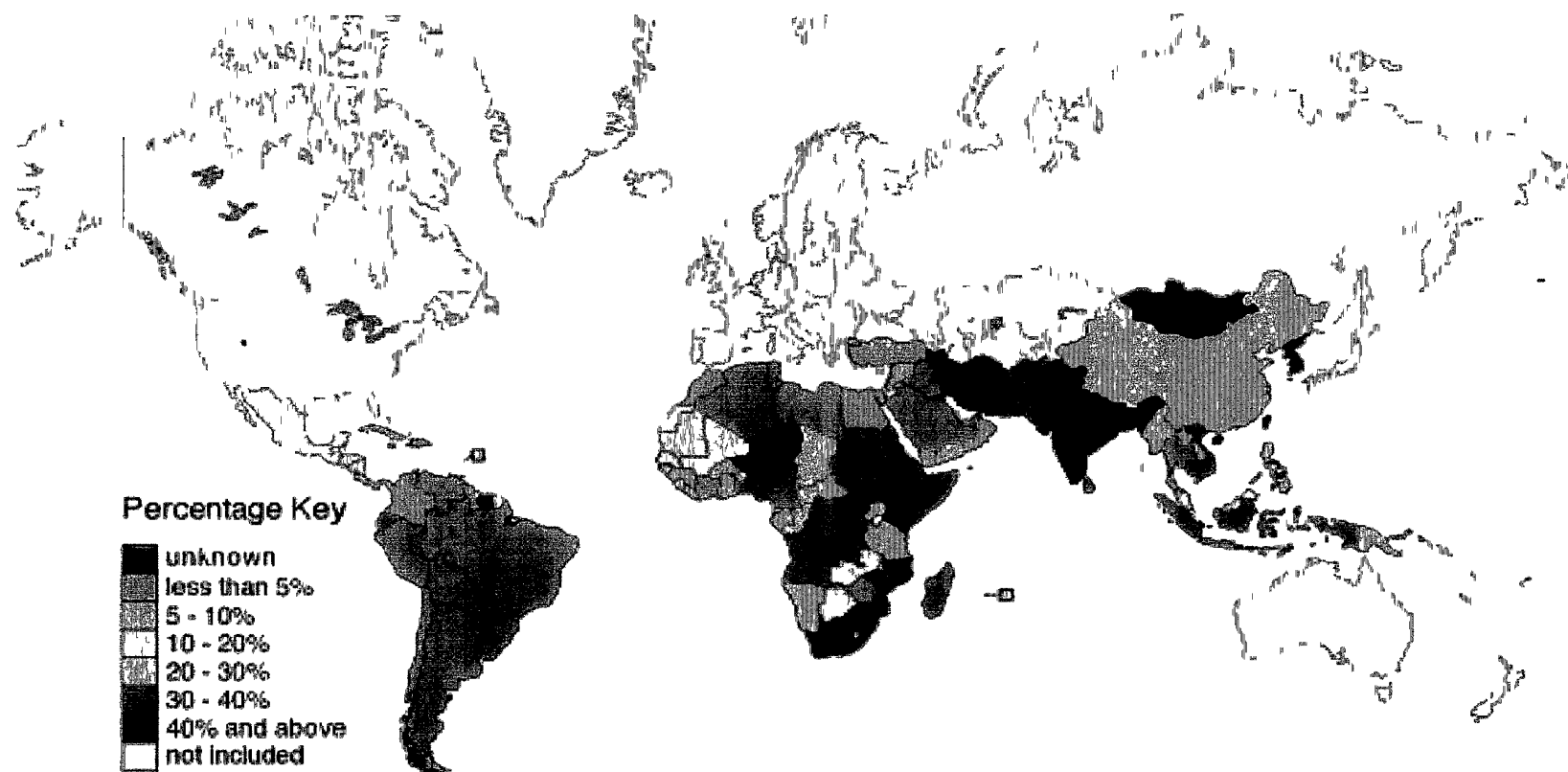
Current level of Undernutrition 1990-1995 (% children underweight, WHO)



Source: FAO, The *Sixth* World Food Survey

Map 2

Year 2015 Projection of Undernutrition (% children underweight, WHO)



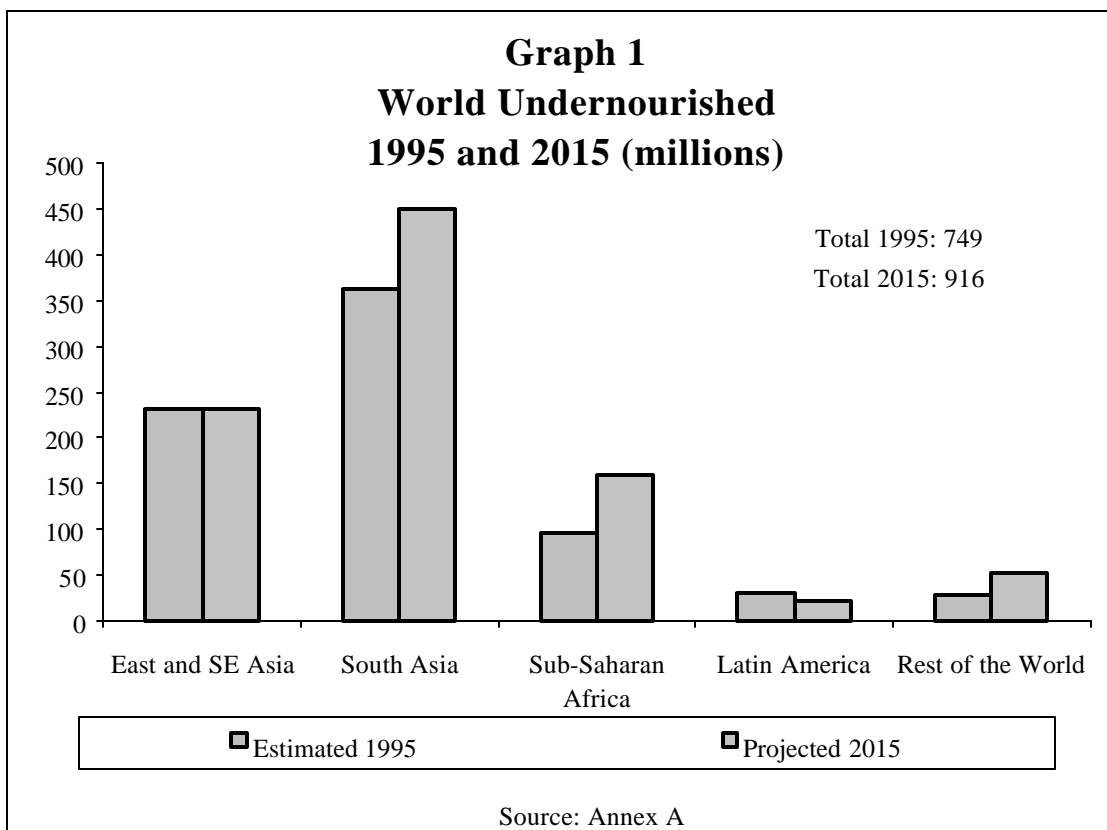
Source AIRD estimates see Appendix A

Maps 1 and 2 indicate relative rates of undernutrition, but they do not show where the absolute level of undernutrition is greatest. For this to be meaningful in terms of the Food Summit target, undernutrition has to be measured for the entire population. Accordingly, actual rates of child malnutrition for 1995 and projected rates for 2015 were extrapolated to the entire population using the methodology described in Annex A, and the results were then expressed in absolute terms, as shown for each of the major regions in Graph 1.³

This graph shows that most of the world's undernutrition is concentrated in Asia. The results are very different, however, for South Asia as compared with East and Southeast Asia. With the exception of a few countries in Southeast Asia, such as Indonesia, Philippines, and Vietnam, where the incidence of undernutrition is still quite high, undernutrition in the region is either low or is decreasing fairly rapidly. Even these three countries are witnessing a steady decline in undernutrition. In South Asia, on the other hand, more than 50 percent of the children under five years of age are undernourished, as measured by weight for age, in Bangladesh, India, and Nepal. The percentages in Pakistan and Sri Lanka are also high. Although the prevalence of undernutrition is decreasing in many of these countries, the absolute numbers of undernourished are rising.

Sub-Saharan Africa is the other region where there is substantial undernutrition. Many of the countries in which undernutrition is highest have experienced major war and civil strife in recent years. Examples include Angola, Ethiopia, Mozambique, Rwanda, Somalia, and Sudan. Other countries, such as Central African Republic, Chad, Congo, and Madagascar, have been persistently poor and underdeveloped. The trend in most of these countries is for a continued increase in the absolute number of undernourished, and also in many cases in the relative prevalence of undernutrition. On average, for example, the number of undernourished in Africa is projected to increase by 50 percent over the next 20 years.

³ Country details are presented in Annex A.



CAUSES OF UNDERNUTRITION

The causes of undernutrition are multiple and complex. They include limited availability of food within a country or region, weak access of household and individuals to food, and poor utilization of food by individuals.⁴ Among the critical variables are:

- food availability, which equals production plus imports minus exports, with adjustment for changes in stocks and for feed, seed, and losses;
- per capita real GDP at the national level, which is related to the ability of households on average to grow or purchase food, but is also related to the ability of governments to provide facilities for education and health, which also have an influence on nutrition;
- depth of poverty, which shows the degree to which some households are below the poverty line regardless of the overall national level of per capita income;

⁴ Rodgers (1990); Schnepf (1991); and Haddad et al. (1997)

- illiteracy among women as a measure of the education and status of women, which are important variables influencing intra-household allocation of food;⁵
- access to safe water and sanitary facilities, which is an important measure of the health of the population, especially in humid areas with high population density, where endemic parasitic and other diseases inhibit the ability to absorb nutrients from food that is ingested.⁶

Graphs 2 through 6 show the levels of each of these variables for East and Southeast Asia, South Asia, Sub-Saharan Africa, Latin America and the Caribbean, and the Rest of the Developing World. More detailed tables for 14 countries and sub-regions are included in the Appendix Tables of Annex A.⁷

Graph 2 shows the level of per capita food availability, expressed as Dietary Energy Supply (DES) in kilocalories per day, in 1990-92 (FAO, 1996). East and Southeast Asia clearly has the highest level, followed closely by Latin America and the Caribbean. South Asia is substantially behind these regions but is well ahead of Sub-Saharan Africa. A similar picture emerges from Graph 3 with respect to per capita real GDP, measured in 1985 purchasing power parity prices. Within Africa, however, the developing nations have an average per capita GDP of \$1,646, while the war-torn and least developed nations have a per capita GDP of \$644 and \$666, respectively.

Average per capita real GDP is only one indicator of poverty since it does not take into account the distribution of income within a country. A better measure is the depth of poverty, defined as the cumulative gap by which income of poor household falls below the poverty line. This variable, taken from the World Bank (1998), is shown in Graph 4. It suggests a substantial degree of poverty within South Asia and Sub-Saharan Africa, especially the least developed countries of SSA.

The low status of women in South Asia is demonstrated in Graph 5, which shows the very high female illiteracy rates that prevail there. Illiteracy is also high for women in SSA, though the difference between the rates for women and men is not as great as in South Asia. Finally, Graph 6 suggests the importance of health problem in all regions arising because of low rates of access of the population to safe water and sanitation.

⁵ King and Hill (1993) reviewed the state and implications of women's education and the extent of the gender gap in education for 152 countries covering the period 1960 through 1985. They also seek to understand why gender gaps exist; Mark Pitt (1995) evaluated the direct and indirect effect of mother's education on child health for 14 Sub-Saharan African countries; Paul Glewwe (1997) has empirical evidence from Morocco that suggest that women primarily use the literacy and numeracy skills acquired in school to assist them in diagnosing and treating child health problems or interacting with health care providers. This also suggests that direct teaching of health knowledge skills in school could substantially raise child health and nutrition.

⁶ Empirical evidence from Rwanda hints at the importance of health infrastructure and sanitary environment in the nutritional status of household members (Schnepf 1991)

⁷ The breakdown of these more detailed tables is as follows: China, Indonesia, Rest of East and Southeast Asia, Pakistan, India, Bangladesh, Rest of South Asia, Ethiopia, Nigeria, War-Torn Sub-Saharan Africa (SSA), Least Developed SSA, Developing SSA, Latin America and Caribbean (LAC), and Rest of World.

In summary, on the basis of these graphs and the more detailed tables in Annex A, we can define the broader dimensions of the principal causes of undernutrition in different regions. In South Asia, which has the highest levels of absolute undernutrition in the world, the problem is not so much inadequacy of food supply, except possibly in Bangladesh. Nor is it one of very low levels of per capita real GDP. Rather it appears to be due to a constellation of interacting factors:

- deep poverty among the rural landless and other particularly vulnerable groups in the society, which results in their failure to gain adequate access to food;
- low education and social status of women, which results in their having little command over the distribution of food to women and children within the household;
- high population density, a humid monsoon climate, and poor access to safe water and sanitation, which leads to poor health and inhibits the utilization of ingested nutrients.

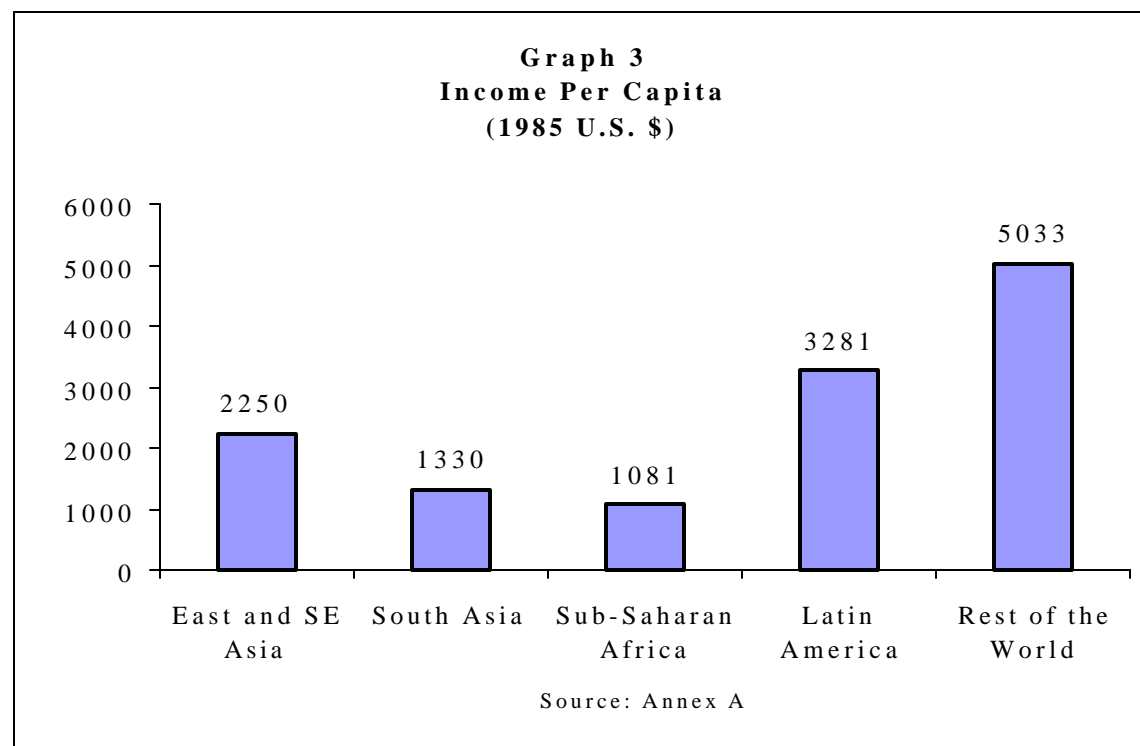
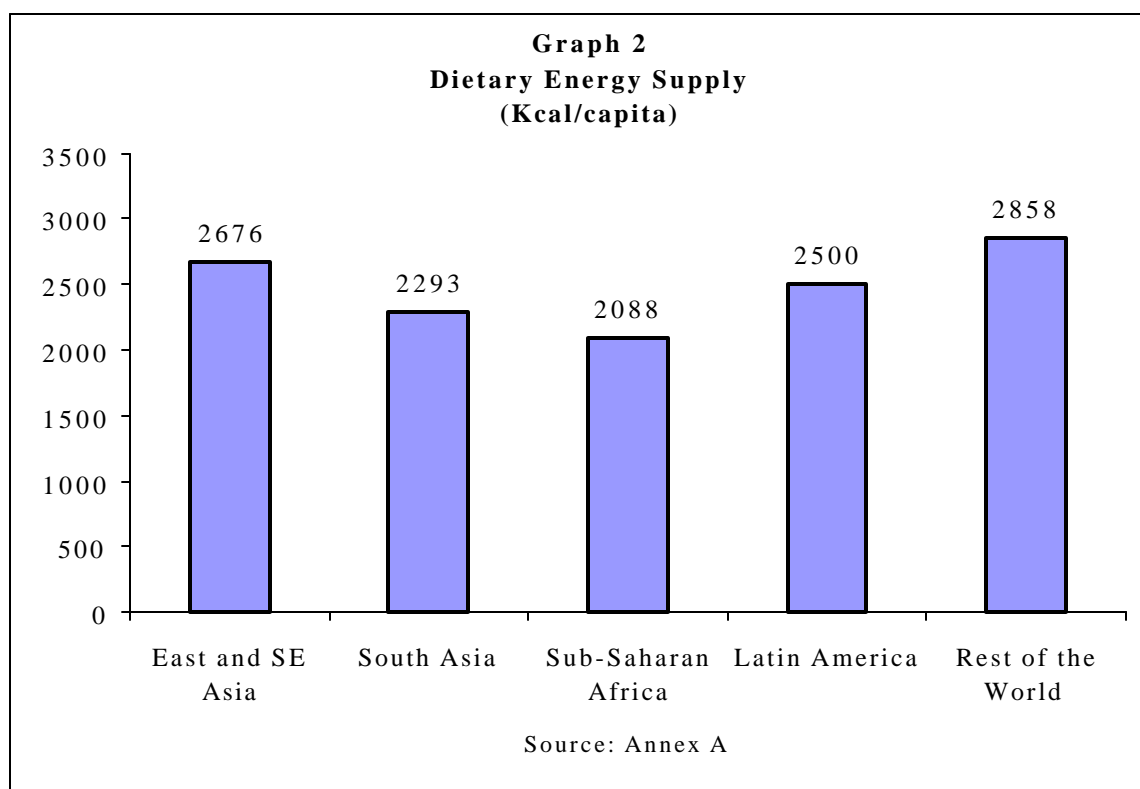
One result is a failure of data on food availability (DES) to accurately predict the extent of undernutrition in South Asia.

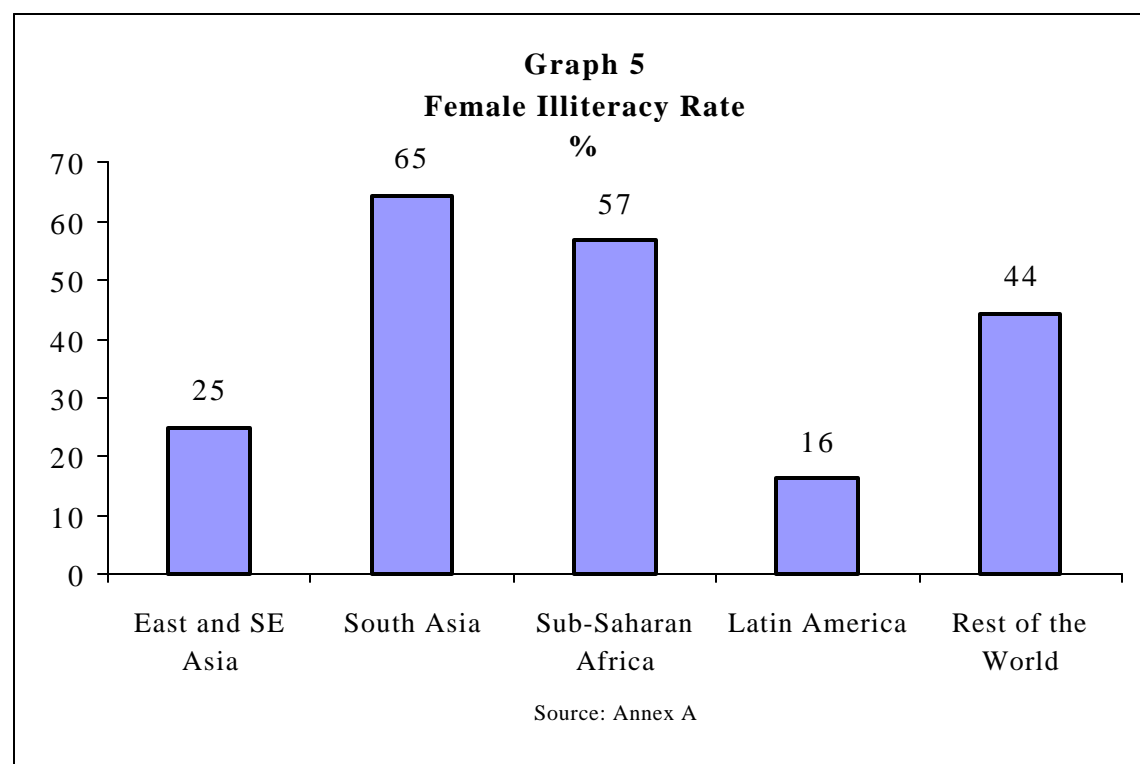
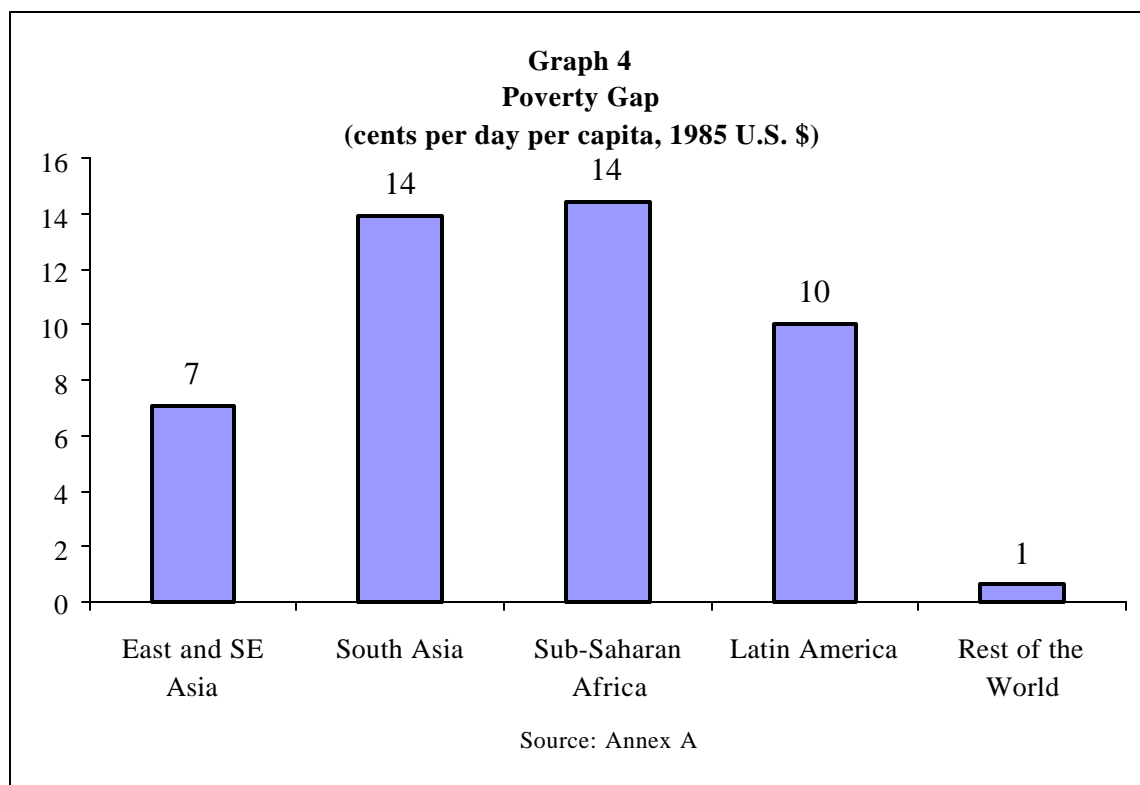
In Sub-Saharan Africa, on the other hand, the problem is much more one of low levels of food availability and low average per capita real GDP, especially in the war-torn and least developed countries. This leads to poverty not so much because of inequality in the distribution of income and wealth but because there is little income and wealth to distribute. Education and health are also problems, but these are due more to low levels of real GDP than to discrimination against women and people living in rural areas. In fact, generally low levels of population density make African populations somewhat less sensitive to the health problems posed in South Asia by lack of safe water and sanitation.⁸

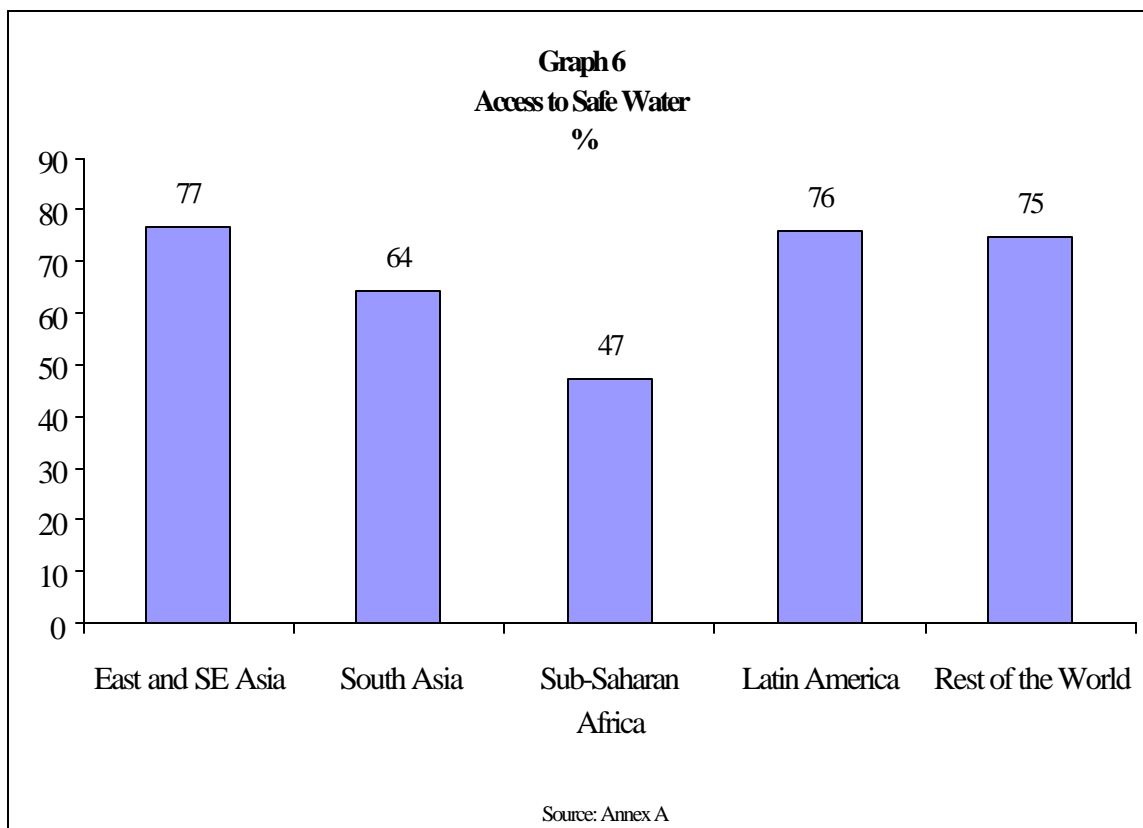
East and Southeast Asia is characterized generally by high levels of food availability, high per capita real GDP, and low levels of poverty in relation to other regions. Women's education and social status are generally better, and there is greater access to safe water and sanitation. Furthermore, the evidence suggests that undernutrition is decreasing in this region, both absolutely and in relation to the total population. Thus the problems in this region are more those of a few specific countries that have yet to partake fully in the growth process than of dealing with widespread undernutrition on a regional scale. Although many of the Asian economies have recently been weakened by a series of financial and other crises, these are not expected to be problems that will have a major long run impact on undernutrition (IFPRI, 1998).

In Latin America and the Caribbean (LAC) and in the Rest of the World, the picture is one of generally adequate food availability, on a par with East and Southeast Asia. Per capita income is much higher than in the other developing countries, but the poverty gap in LAC is considerably higher than would be expected from this average income level, suggesting the possibility of important pockets of undernutrition. In addition, although female illiteracy is relatively low in LAC, it is quite high in the Rest of the World, most of which is Muslim, indicating the possibility of undernutrition within households.

⁸ Africa, of course, does have major health problems associated with AIDS, malaria, and parasitic diseases.







CONSEQUENCES AND OPPORTUNITIES

The consequences of the high levels of undernutrition that exist in the world are severe. Above all they are severe for the more than 800 million people that suffer from chronic hunger. Aside from their physical distress, these people are less able to work, reducing the income they can earn for themselves and for the nation. Poverty and undernutrition thus play upon one another in a viscous cycle that has a number of adverse results.

First this viscous cycle can lead to political and military crisis. There is substantial evidence that even if poverty and undernutrition are not the proximate causes of these crises, they are often at least contributing factors (Messer, Cohen, and D'Costra, 1998). Furthermore, the cost of dealing with crisis is often far higher than what would have been necessary to avert the crisis in the first place.

Second, chronic undernutrition creates conditions of uncertainty regarding emergency food aid. Where large numbers of people are already undernourished, the margin for error in dealing with the consequences of drought, war, and other disasters is comparatively slim. As the world, and particularly the United States, moves away from food aid drawn upon surplus stocks and towards food aid as a budgetary expenditure, this

leads to greater uncertainty regarding the fiscal and logistical requirements of emergency food shipments.

Third, poverty and undernutrition feed upon one another in ways that limit the development of local markets for food. This decreases the reliability of markets in these countries for exports from the food surplus countries such as the United States. As production continues to increase in food exporting countries at rates faster than the growth of domestic consumption, these countries must rely increasingly on the expansion of markets in developing countries. Whatever inhibits the growth of these markets and makes them less reliable acts as a disincentive to agricultural research and production, which makes the world potentially more vulnerable to global food shortages.

Finally, the viscous cycle of poverty and undernutrition sets back the spread of democracy and good governance to the developing nations. People who are hungry, unproductive, and deprived have a difficult time looking out for their own interests. This encourages corruption, lack of transparency, and poor governance.

The establishment of the Food Summit target presents a unique opportunity to act effectively to break this viscous cycle. The target is visible, measurable, and attainable. It can be achieved, as this report demonstrates, without enormous financial sacrifice. All it requires is strong commitment and global leadership. The moment is particularly appropriate, moreover, because of the President's recent trips to Africa, Asia, and Latin America – demonstrating the commitment that the United States has to the developing world.

The moment is also appropriate because of a confluence of other factors. First, the U.S. agricultural community has developed a strong global perspective regarding its own self-interests. Gone are the days when this community pressed for high domestic prices and accumulation of food stocks. Today U.S. agriculture is primarily interested in stimulating overseas demand for U.S. farm products. But this is also what is needed to promote food security in developing countries by raising incomes and improving markets for food.

Second, the policy environment in many developing countries has improved enormously over the past 15 years. Trade and exchange rate policies are more open, trade taxes have been lowered, fiscal deficits have been reduced, markets have been freed up, and legal and regulatory environments are more conducive to private sector investment and productive activity. This means that interventions to increase food security through productive investments that may have failed 15 years ago are much more likely to succeed today.

Finally, the world is currently experiencing, at the global level, a period of peace and prosperity that has not existed for almost a century. Despite the economic crisis in Asia and the wars and other conflicts in Africa, lower expenditures for national defense and unprecedented economic prosperity in most of the world create the best opportunity in at least a hundred years to do something significant about world hunger.

LEVELS OF INTERVENTIONS

There are a number of different levels at which interventions can be undertaken to alleviate hunger and undernutrition. These levels may be global, national, sectoral, or household. Some examples are illustrated in Table 1.

Table 1

Interventions to Reduce Undernutrition	
What is needed	How to achieve it
Global	
Secure access to food in world markets	International agreements
Peace and physical security	Conflict prevention and recovery
National	
Promote democracy in rural areas	Civil participation and advocacy
Enabling environment	Macro, and trade and legal reform
Sectoral	
Rural production and marketing infrastructure	Public investment in roads
Increase farm productivity	Private technology transfer and public agricultural research
Household	
Raise entitlement to food	Targeted food aid
Empower women	Women's education
Improve rural health conditions	Safe water and sanitation

At the global level it is important that sufficient food be produced to feed the world's population adequately. It is also important that global markets and other institutions operate effectively to permit food to move reliably from areas of surplus to areas of deficit. This requires a host of international agreements and other measures, such as those coming under the World Trade Organization.

At the national level, it is essential that there be peace and a high degree of physical security if food supplies are to be transported safely within the country and if stocks of food are to be secure. This requires conflict prevention and resolution whenever possible. Where conflicts do arise, their speedy resolution and the economic recovery of the countries concerned should be a high priority. Research shows that the undernutrition resulting from war and civil strife is high and that the costs of dealing with it through emergency food aid are also high (Messer, Cohen, and D'Costa).

Other interventions at the national level include the promotion of democracy in rural areas and the creation of an enabling environment for trade and investment. The promotion of democracy through civil participation and advocacy can be important in creating the conditions for the sustainable use of natural resources, especially those that are collective nature. This helps to increase the availability of food. Effective political advocacy also helps to ensure that the rural population receives its fair share of rural infrastructure, such as roads, irrigation works, schools, health facilities, and safe water

and sanitation. This can have an important influence on agricultural productivity, education, and health, all of which favorably influence nutrition.

Research has shown that a policy environment opened to international trade and investment is important for higher rates of economic growth (Sachs and Warner, 1996). This, in turn, has a favorable effect on food availability, women's education, and access to safe water and sanitation, all of which reduce undernutrition. In addition, countries can benefit by reducing trade taxes and other barriers to food imports, which lowers food prices and increases real incomes used to purchase food.

At the sectoral level, the two most important types of interventions are investment in productive rural infrastructure and in agricultural research, extension, and education. These increase agricultural productivity, which in turn raises national income through a multiplier effect. The result is increased food availability, women's education, and safe water and sanitation – and, consequently, improved nutrition. Alternatively, investments may be made directly in rural health, water, and sanitation, which will improve the health of the rural population and allow more efficient utilization of existing food.

At the household level, the most effective way of improving nutrition is to direct interventions towards women.⁹ One approach, which has been used quite successfully in a number of countries using Title II food aid, is to channel resources through maternal and child health programs. These resources can be monetized to pay not only for health care but also for nutritional education, functional literacy programs, family planning, improved access to safe water and sanitation, and direct income transfers. In addition, some of the aid can be channeled to participants directly in the form of food assistance. Finally, investment in women's education, especially at the secondary school level, has been shown to have important nutritional benefits (Smith and Haddad, 1998).

WHAT WILL IT COST?

In order to estimate the cost of achieving the Food Summit target of reducing the number of undernourished to 400 million by the year 2015, empirically derived parameters were used to link the interventions discussed above to resulting declines in undernutrition. A number of scenarios were then costed for different combinations of these interventions to achieve the Food Summit target. It was assumed that these interventions are incrementally added to the baseline interventions assumed in the projections discussed earlier and that they are for the most part financed by the donors. The countries and sub-regions for which these calculations were made are China, Indonesia, Rest of East and Southeast Asia, Pakistan, India, Bangladesh, Rest of South Asia, Nigeria, Ethiopia, War-Torn Sub-Saharan Africa (minus Ethiopia), Least Developed SSA, Developing SSA, Latin America and the Caribbean, and Rest of the Developing World. Because of higher levels of per capita income and lower levels of undernutrition in Latin America and the Caribbean and in the Rest of the World, it was

⁹ There is extensive literature on the nutritional benefits of women's status, education, and control over resources within the household. See, for example,

assumed that interventions in these regions would be financed by the countries themselves rather than by the donors, and these costs do not appear in the totals. The sole exception to this is technical assistance for policy change, which was assumed to be financed by the donors. Details of these calculations are contained in Annex A.

Scenario 1: Equal Distribution

The first scenario assumes that all four policy interventions-reducing war and civil strife, increasing democracy, opening trade and investment policy environment, and reducing barriers to food imports-are achieved through a combination of international pressure and incentive and technical assistance and training at the national level. For interventions at the sectoral and household levels, the same level of funding is spent for each undernourished person in each of these countries and sub-regions and the funds are distributed equally among the interventions. These are:

- construction of rural roads
- agricultural research and extension
- monetized food aid targeted via maternal and child health programs
- female education
- improved access to safe water

The results of this scenario are presented in Table 2. They show that the total cost of achieving the Food Summit target under this scenario is \$ 65 billion, with the largest amounts spent in Asia because most of the undernourished are concentrated there. Although this scenario may be equitable, it is not very efficient in achieving the target.

Table 3 shows the cost per person removed from the list of undernourished by country/region and type of intervention. These costs are derived by estimating both the cost of each intervention and its effectiveness in decreasing the number of undernourished.

Only minimal costs have been estimated for reducing war or civil strife. These comprise the costs of engaging conflicting parties in a sustained dialogue that results in resolution of the conflict. It is assumed that this will remain an important goal of U.S. foreign policy, but it is impossible to estimate any additional costs involved. Furthermore, it is assumed that other interventions cannot be carried out as long as there is a significant level of physical insecurity so that progress must be made in the war-torn countries if undernutrition is to be reduced.

Table 2

IMPACT OF INTERVENTIONS ON UNDERNOURISHED (millions)

Scenario 1: Equal Distribution

	East & South East Asia	South Asia	War torn SSA	LDC SSA	Developing SSA	Latin America	Rest of World	Total # million people	Total Cost
National Political Policy									
Reduce war	-4	-1	-14	0	0	0	-4	-24	513
Increase democracy	-3	-3	-1	0	-1	0	-1	-9	1710
National Economic Policy									
Open trade	-11	-19	-1	0	-1	0	-4	-37	1997
Reduce food tariffs	-5	-2	-2	-1	-2	0	-2	-15	
Sectoral Policy									
Rural roads	-9	-10	-6	-3	-1	0	0	-29	12221
Agricultural research	-13	-75	-8	-2	-4	0	0	-103	12221
Household Policy									
Targeted food aid	-17	-25	-3	0	-1	0	0	-46	12221
Female literacy	-31	-108	-14	-4	-6	0	0	-162	12221
Safe water	-7	-26	-2	0	-1	0	0	-36	12221
Own resources	0	0	0	0	0	-13	-39	-52	0
Total Reduction in Undernourished	-100	-270	-52	-10	-17	-14	-50	-513	
Total Cost	Million \$	17795	33753	7214	2199	3784	186	396	65326

Table 3**COST EFFECTIVENESS OF INTERVENTIONS : REDUCTION IN UNDERNOURISHED (\$/Capita)**

	East and South East Asia	South Asia	Sub-Saharan Africa	Latin America	Rest of World
National Policy Initiatives					
Political Stability	15	24	20	62	23
Democratization	169	91	453	800	301
Economic	43	33	110	81	22
Sectoral Investments					
Rural Roads	390	1162	249	344	94
Agricultural Research	262	75	312	1305	1656
Household					
Targeted Food Aid	571	347	961	1555	164
Female Education	114	49	130	439	133
Increase access to safe water	586	236	1021	2194	754

Of the interventions for which costs have been estimated directly, the least cost-effective for at least for some countries/sub-regions are (1) construction of rural roads and (2) investment in safe water delivery. It is recognized, however, that these have important interactive effects with other variables. For example, the success of agricultural research depends on at least a minimum level of road infrastructure. Furthermore, access to safe water, while not by itself a very important contributor to improved nutrition, interacts with increased food availability and women's education. These interactive effects are taken into account in the final scenario, which achieves a balance between the different interventions, but in a relatively cost-effective way.

Technical assistance in support of economic policy reform is very cost-effective in most countries where reform is still needed. It is assumed here that governments are already committed to reform so that the only costs are those associated with providing technical assistance. The same is true of democratization, except that its influence on undernutrition is much weaker than that of economic policy reform, which has an important effect on economic growth.

Agricultural research, extension, and education is quite cost effective in reducing undernutrition, especially in South Asia and most of sub-Saharan Africa. Targeted food aid is also relatively efficient in at least some countries. It is assumed in the analysis that this aid is monetized and used to pay for a range of activities channeled through maternal and child health care programs. The particular activities are not specified but presumably would include health care, nutritional education, functional literacy, family planning, improved access to safe water and sanitation, and agricultural extension to women. They could also include food assistance and direct income supplements. The critical assumption here is that the total level of assistance is sufficient to move at least one-half the poor above the poverty line, assuming a capital output ratio of 3.0. That is investments can be undertaken that equal three times one-half the level of the poverty

gap, and these investments enable the beneficiaries to remain above the poverty line indefinitely.

Another intervention that is very cost effective is investment in woman's education, especially at the secondary school level. This has an important effect on the allocation of food within the household. It also helps to raise the level of household income, benefiting all members of the household.

Scenario 2: Least Cost Distribution

In Scenario 2, shown in Table 4, assistance in the reduction of war, democratization, and economic policy reform was assumed to remain at the same level as in Scenario 1. This is because these reforms are considered essential to the success of reforms at the sectoral level. Only those reforms carried out at the household level can be presumed to be successful in the absence of physical security, a reasonable level of democratic governance, and an enabling economic environment.

At other levels, resources were reallocated in directions leading towards greater cost-effectiveness in achieving the Food Summit target. Investment in rural roads and in safe water were abandoned altogether, and resources were reallocated not only towards other interventions but also marginally towards South Asia to the detriment of most other regions. The result is a substantial reduction in the cost of achieving the target from \$65 billion to \$39 billion. However, a very large part of the nutritional gain comes from investments in agricultural research and female education in South Asia. The former may be less than totally realistic given the fact that yields are already at moderate levels. Nevertheless, there is still substantial room for yields to increase, and there may be even further potential for increases in labor productivity associated with mechanization as agriculture modernizes.¹⁰ As far as women's education is concerned, this is certainly an area in South Asia where investment is likely to have a high payoff in reducing undernutrition.

¹⁰ It is sometimes asserted that there is little scope for further increases in agricultural production in South Asia because most of the opportunities for improvement have already been exploited on good land and the opportunities that exist on poorer land are much less. This is contradicted for India, however, by the relatively high returns found to use of high yielding varieties and other interventions in areas of so-called low potential (Hazell and Fan, 1998).

Table 4**IMPACT OF INTERVENTIONS ON UNDERNOURISHED (millions)****Scenario 2: Least cost distribution**

	East & South East Asia	South Asia	War torn SSA	LDC SSA	Developing SSA	Latin America	Rest of World	Total # million people	Total Cost
National Political Policy									
Reduce war	-4	-1	-14	0	0	0	-4	-24	513
Increase democracy	-3	-3	-1	0	-1	0	-1	-9	1710
National Economic Policy									
Open trade	-11	-19	-1	0	-1	0	-4	-37	1997
Reduce food tariffs	-5	-2	-2	-1	-2	0	-2	-15	
Sectoral Policy									
Rural roads	0	0	0	0	0	0	0	0	0
Agricultural research	-13	-145	-3	-1	-3	0	0	-164	19079
Household Policy									
Targeted transfers	-42	-19	-1	0	0	0	0	-61	8342
Female literacy	0	-133	-13	0	-5	0	0	-150	7712
Safe water	0	0	0	0	0	0	0	0	0
Own resources	0	0	0	0	0	-13	-39	-52	0
Total Reduction in Undernourished	-77	-322	-35	-2	-11	-14	-50	-513	
Total Cost	Million \$	10067	24707	2401	392	1205	186	396	39353

At other level, resources were reallocated in directions leading towards greater cost-effectiveness in achieving the Food Summit target. Investment in rural roads and in safe water were abandoned altogether, and resources were reallocated not only towards other interventions but also marginally towards South Asia to the detriment of most other regions. The result is a substantial reduction in the cost of achieving the target from \$65 billion to \$39 billion. However, a very large part of the nutritional gain comes from investments in agricultural research and female education in South Asia. The former may less than totally realistic given the fact that yields are already at moderate levels. Nevertheless, there is still substantial room for yields to increase, and there may be even further potential for increases in labor productivity associated with mechanization as agriculture modernizes.¹¹ As far as women's education is concerned, this is certainly an area in South Asia where investment is likely to have a high payoff in reducing undernutrition.

Scenario 3: Efficiency with equity

Whatever the efficiency of Scenario 2, it is clear that it leaves much to be desired in terms of equity, especially the extent to which Sub-Saharan Africa is excluded from major gains. Consequently, a third scenario was developed in which Sub-Saharan Africa is stressed to a much greater extent. This scenario is presented in Table 5. Heavy emphasis is placed especially on war-torn SSA, where substantial gains in nutritional status are possible at only moderate cost. Interventions in SSA are also strongly oriented towards agricultural research and female education. The cost of this scenario is \$43 billion, which is not much higher than Scenario 2. Further shifts towards Africa could also be undertaken without raising costs too much further.¹²

¹¹ It is sometimes asserted that there is little scope for further increases in agricultural production in South Asia because most of the opportunities for improvement have already been exploited on good land and the opportunities that exist on poorer land are much less. This is contradicted for India, however, by the relatively high returns found to use of high yielding varieties and other interventions in areas of so-called low potential (Hazell and Fan, 1998).

¹² If the goal were set of reducing the proportion of undernourished by an equal percentage across all countries until the aggregate target were met, then Scenario 3 would result in the following rates of success in achieving this goal: East and Southeast Asia 41%, South Asia 134%, War-Torn SSA 109%, Least Developed SSA 73%, Developing SSA 67%, LAC 100%, and Rest of World 100%. Of course LAC and Rest of World accomplish this using only their own resources.

Table 5

IMPACT OF INTERVENTIONS ON UNDERNOURISHED (millions)**Scenario 3: Rational distribution**

	East & South East Asia	South Asia	War torn SSA	LDC SSA	Developing SSA	Latin America	Rest of World	Total # million people	Total Cost
National Political Policy									
Reduce war	-4	-1	-14	0	0	0	-4	-24	513
Increase democracy	-3	-3	-1	0	-1	0	-1	-9	1710
National Economic Policy									
Open trade	-11	-19	-1	0	-1	0	-4	-37	1997
Reduce food tariffs	-5	-2	-2	-1	-2	0	-2	-15	
Sectoral Policy									
Rural roads	0	0	-5	-2	0	0	0	-7	1172
Agricultural research	0	-137	-15	-4	-8	0	0	-162	18664
Household Policy									
Targeted food aid	-18	-25	-4	0	0	0	0	-47	8889
Female literacy	-10	-121	-12	-4	-5	0	0	-151	8505
Safe water	0	-8	0	0	0	0	0	-8	1885
Own resources	0	0	0	0	0	-13	-39	-52	0
Total Reduction in Undernourished	-51	-316	-53	-11	-16	-14	-50	-512	
Total Cost	Million \$	4040	27826	6720	1748	2418	186	396	43335

Table 6

IMPACT OF INTERVENTIONS ON UNDERNOURISHED (millions)**Scenario 4: Policy absent**

	East & South East Asia	South Asia	War torn SSA	LDC SSA	Developing SSA	Latin America	Rest of World	Total # million people	Total Cost
Household Policy									
Targeted food aid	-83	-126	-20	0	0	0	0	-230	47243
Female literacy	-23	-146	-14	-5	-5	0	0	-192	11379
Safe water	-6	-30	-3	-1	-1	0	0	-40	13288
Own resources	0	0	0	0	0	-13	-39	-52	0
Total Reduction in Undernourished	-135	-327	-55	-7	-10	-14	-50	-600	
Percent of Target	117% Total	100% Nonpolicy							
Total Cost	Million \$	12614	50752	10121	726	951	186	396	71911

Scenario 4: Policy absent

The last Scenario, shown in Table 6, looks at what could be done if there were no progress in reducing war, democratization, or economic policy reform. Under these conditions, investment in roads or agricultural research would be relatively ineffective since conditions would not be ripe to benefit from these investments. Nevertheless, interventions could be attempted at the household level with respect to targeted food aid, female education, and access to safe water, though in the absence of physical security even these would be difficult to implement. As the table shows, however, this scenario, even if it worked in meeting the Food Summit target, would be quite expensive at \$72 billion.

U.S. COMPARATIVE ADVANTAGE

The scenario analysis indicates that it should be possible to achieve the food summit target for a total of about \$45 billion, or \$3 billion per year spread out over a period of 15 years. This is about 5 percent of current levels of official development assistance – not an impossible sum if all donors are involved.

In considering how the United States could best contribute to the alleviation of undernutrition, it is important to bear in mind the types of interventions in which it has a comparative advantage. These relate to U.S. position in the world economy, its experience with different types of foreign assistance, and other underlying factors.

Most Productive Farmers in the World

For more than a century, the U.S. system of agricultural research, extension, and education has produced the most productive farmers in the world. This system has been led by the land grant universities and the U.S. Department of Agriculture. Seed companies, equipment dealers, and other input suppliers have also been an important vehicle for extension. Techniques of plant and animal breeding developed under the system have been transplanted to developing countries via the international agricultural research centers under the aegis of the Consultative Group on International Agricultural Research. The land grant universities have themselves assisted the developing nations to modernize their agricultural sectors.

Unfortunately, the funds devoted to international agriculture and rural development have decreased dramatically. For example, funding in FY 1986 was at a level of \$1.2 billion; by FY 1997, it had dropped to an estimated \$240 million (McPherson, 1998). This represents an enormous waste of one of our most precious assets that could be used to aid in the fight against world hunger: the knowledge that resides in the scientists, extension agents, educators, administrators, and others who have experience with agricultural development.

NGO Experience in Food Aid Delivery and Community Participation

NGOs have a wealth of experience associated with the delivery of food aid and community participation in a variety of programs. Of particular relevance is the use of monetized food aid under Title II to fund the activities of maternal and child health care programs. The activities of these programs have been expanded to include nutritional education, functional literacy, family planning, investment in safe water and sanitation, and agricultural extension to women. In addition, food aid has been channeled via these programs to needy women, infants, and children. Finally, NGOs have participated in programs designed to build community participation in the forging of linkages with agricultural research in order to promote environmentally sustainable agricultural development.¹³

Leader in International Trade Negotiations

Since the 1930s, the United States has been the leader in promoting free trade through international trade negotiations, culminating most recently in the Uruguay Round. Increasingly these have focused on agriculture and are scheduled to do so again in the next round. They are also very much concerned with intellectual property rights, including those involving bio-technology – a critical issue for agricultural development.

Although substantial progress has been achieved in defining acceptable policy interventions, tariff ceilings, and tariff implementation modalities, numerous loopholes still exist. Many developing countries maintain protective food import regimes. Although food exporters are committed to reducing direct support to agriculture, reducing or eliminating export subsidies, and shifting from price controls to direct farmer income support, they are still susceptible to pressures from the agricultural community when market prices begin to decline. Furthermore, reliability of food exports is made questionable when food can be the subject of economic sanctions. Thus there is much to be done in creating efficient and reliable world food markets, in which the U.S. will play a vital role.

Worldwide Strategic Interests

Today the United States clearly has worldwide strategic interests that result in its being involved in every area of the globe. Whether these interests be commercial, financial, political, or humanitarian, the U.S. cannot escape its responsibilities. If anything, these seem to have increased since the ending of the Cold War. This involvement has important implications for food security in areas of actual and potential war and civil strife. In many instances, prevention of violence or assisting nations in recovering from violence as quickly as possible may be the least costly way of meeting U.S. objectives, including those linked to food security.

¹³ An example is the On-Farm Productivity Enhancement Program (Antoine and Byrnes, 1993)

Strong Private Sector

One of the great sources of strength in the U.S. economy is its vibrant private sector. In recent years, this sector has been playing an expanded role in developing nations, involving direct and portfolio investment, technological transfer, exploitation of market opportunities, and managerial assistance. This role is increasingly being applied to agricultural production, processing, marketing, and trade. An enormous opportunity exists to apply the motivation and know-how of the private sector to the task of assuring food security in the developing world.

U.S. STRATEGY FOR MEETING THE FOOD SUMMIT TARGET

Analysis of the cost-effectiveness of various interventions to assure food security plus analysis of the comparative advantage of the United States in undertaking these interventions to the strategy outlined in this section. This strategy distinguishes between actions to be undertaken at the global, national, sectoral, and household levels. It also distinguishes between those actions thought to be most effective in South Asia, where the major problems are income inequality, poor health conditions, and low status of women, and those thought to be more effective in Africa, where the problems are war and civil strife, low food availability, poverty related to low levels of average per capita income, low overall school enrollment, and lack of access to safe water and sanitation.

Global Interventions

In its global negotiations, the United States should continue to press for free trade in food as well as in other goods and services. This should involve encouraging countries to open their borders to food imports as a means of lowering domestic prices, increasing real incomes of the poor, and increasing food availability from imports as well as domestic production. To do this, however, the U.S. will have to guarantee the reliability of food supply by eliminating commercial food shipments from the list of goods potentially subject to economic sanctions. At the same time, it should encourage the European Union to abandon the practice of effectively taxing its food exports when world market prices rise in order to maintain more stable prices within the Union.

It is also important that the United States press forward on the international front to establish rules regarding trade in bio-technology products and to guarantee secure intellectual property rights insofar as bio-technology is concerned. There is major concern in the United States that the European union and other countries will adopt policies regarding the importation and planting of bio-technology products that will adversely affect U.S. agricultural exports. At the same time, there have been problems related to the protection of property rights to bio-technology where production of seeds has taken place in developing countries. Given the enormous potential that exists for bio-technology to contribute to alleviating undernutrition, it is vital that an appropriate legal and institutional framework be put in place.

A third area for international cooperation is with respect to rational management of shared resources. An example of particular importance to the food security of coastal population is in the conservation and sustainable exploitation of ocean fisheries.

National Interventions

The preceding analysis has demonstrated the effectiveness of interventions in reducing war and civil strife, promoting democratization, and encouraging economic policy reform not only in contributing directly to the alleviation of undernutrition but also in setting the stage for other interventions to be effective. The U.S. has been an effective advocate of peace, democracy, and economic reform for many years. The benefits from this advocacy can now be seen to include progress in meeting the Food Summit target. Consequently, it is important that the United States continue to press forward in this direction and that it consider this action to be one of the ways in which it is contributing to meeting the Food Summit target. In addition, the United States should increase its contribution to technical assistance and training in policy reform, for which its academic community is internationally recognized.

Sectoral Interventions

Sectoral interventions include investment in rural infrastructure and agricultural research, extension, and education. Investment in rural infrastructure can best be left to the World Bank and other donors, given that the United States has very limited resources and no strong comparative advantage in this area. On the other hand, the U.S. has extensive experience in agricultural research and development, which is largely going to waste because of the precipitous decline in funding that has occurred in recent years. It is proposed, therefore, that an important area of concentration for the United States in meeting the Food Summit target be agricultural research, extension, and education. It is further proposed that most of this effort be concentrated on Sub-Saharan Africa, where the problem of food availability and rural income growth is likely to be severe for a number of countries, but that some attention also be devoted to Asia, where population density is high and increasing pressure on the land is an important problem. Furthermore, the institutional environment in which agricultural development can take place differs markedly between the two continents.

Sub-Saharan Africa. In most of Sub-Saharan Africa, there is a vast need for agricultural research, extension, and education. During the colonial period, most research was concentrated on cash crops for export, such as coffee, tea, cocoa, groundnuts, cotton, sisal, oil palm, and rubber. From independence, more research effort was devoted to food crops, often using seeds and other plant materials supplied by the international agricultural research centers (IARCs). However, the national agricultural research systems (NARS) soon began to experience severe financial difficulties, which not only decreased their effectiveness in conducting research but also resulted in their losing well qualified personnel. At the same time, funding for the IARCs also declined.

Even more discouraging was the ineffectiveness of the national extension systems, which were under-funded and discouraged by weak systems of incentives. This led to the creation of publicly owned regional development enterprises, usually financed by the donors, which were financially and administratively autonomous from the central government. These enterprises were the main conduit for the integrated rural development projects of the 1970s, which combined extension, credit, input delivery, processing, and even health care and functional literacy programs in the same package. This created an enormous financial and managerial burden, which most of these enterprises were unable to sustain after donor funding ceased. The result was the collapse of any effort at agricultural extension.

Yet there have been important success stories in African agricultural development. One has been the development and spread of hybrid maize varieties in Zimbabwe. Another has been the growth of rice production in the irrigated perimeter of the Office du Niger in Mali. Also successful have been the cotton schemes run by CMDT in southern Mali and Cargill in Tanzania. The major ingredients of success in these projects have been the importance of the private sector, a free market environment, a profitable cash crop, a viable technology available to be transferred and adopted, and a mechanism for linking farmers to the researchers.

In areas where cash crop opportunities are not as readily apparent, a different model may have to be used. One such model, which has achieved considerable success in Africa, is the On-Farm Productivity Enhancement Program (Antoine and Byrnes 1993).¹⁴ This program uses NGOs to link farmers with researchers working on improved seeds and soil fertility. An important element is local community participation. Farmers work together to ascertain their needs, to decide what innovations they want to try, and to develop standards by which they can judge the success of these innovations.

It is clear that innovative approaches must be used to achieve success in programs involving agricultural research, extension, and education in Sub-Saharan Africa. Some possibilities that might be considered are as follows.

- Establishment of an endowment fund to finance a small grants for innovative projects involving agricultural research, extension, and education. This would help to meet the operating expenses of the NARS and to assure that valuable research is continued.
- Cooperative agreements with the U.S. land grant universities to enable them to train African agricultural scientists and extension experts and to support research, extension, and education in Africa.
- Additional resources for the African Food Security Initiative to assure that it can finance innovative approaches to food security involving production, processing, marketing, storage, and trade of staple foods.
- Financing of participatory extension programs involving NGOs, based on a model similar to that of the On Farm Productivity Enhancement program.

¹⁴ The program was implemented jointly by Winrock International Institute for Agricultural Development, the Center for PVO/University Collaboration in Development, Save the Children, and several other NGO partners.

- Establishment of public-private partnerships similar to the Chile Foundation for the purpose of facilitating the transfer of agricultural production and processing technology to Africa and linking it to public sector research.

South Asia. The major difference between Sub-Saharan Africa and South Asia insofar as agricultural research, extension, and education is concerned is that, in contrast to SSA, the institutions in South Asia are in place to conduct agricultural research and extend its results to the farming community. The major problem here, instead, is that there is so much pressure on the land that it is difficult for production to keep up with population growth despite the fact that agriculture is already reasonably productive. What is needed is a sustained research effort to shift the yield curve further, partly through traditional research and partly through research involving bio-technology. It is recommended, therefore, that an endowment fund to finance small research grants, similar to the one recommended for Africa, be established in Asia as well.

Global Research on Bio-Technology. The main danger with current bio-technology research, which is funded to a substantial degree by the private sector, is that it will focus on the problems of the industrial countries, where the largest payoffs can be expected. Thus there is substantial effort going into quality improvement, micro-nutrient fortification, and resistance to pests, which may not be the priorities of the developing world. It is recommended, therefore, that a grants program be established to assure that research in bio-technology is directed at least in part towards the problems of the developing nations.

Household Interventions

Some of the most cost-effective interventions can be made at the level of the household. This is especially important in South Asia, where undernutrition is due less to low levels of food availability than to a combination of poverty, low status of women, and poor health conditions. The World Bank is today embarked on a major program to improve access to safe water and sanitation in developing countries. Thus the U.S. should probably focus, instead, on other actions. The following interventions at the household level could form part of the U.S. strategy to meet the Food Summit Target. Although these efforts would be concentrated in Asia, they could also be applied to Sub-Saharan Africa to a lesser degree.

Targeted Food Aid. A considerable amount of Title II food aid is currently channeled through maternal and child health care programs. Some of this aid is monetized and used to pay for the programs and some is consumed directly as food assistance by participating women and children. Monetization is usually carried out by the NGOs who administer the programs. Aside from health care and food assistance, the programs often include nutritional and functional literacy education, family planning, improved access to safe water and sanitation, and agricultural extension for participating women.

The strategy envisioned here would strongly support these programs. It would also emphasize their developmental nature. That is, rather than being seen as essentially a safety net, these programs would be oriented towards eliminating participants' dependence on them. This could involve increased monetization of the food aid and the extension of the use of these funds to include capital investments made by participants to generate future income. These investments might include the purchase of sewing machines and other equipment, the leasing of shops or other physical facilities, and working capital.

A second feature of the strategy envisioned here is to assure that the distribution of food via these programs does not disrupt normal marketing of food. It is important to move as much as possible from a dual system involving public sector or NGO distribution, on one hand, and private sector marketing, on the other. This dual system impedes development of the private market and creates opportunities for graft and corruption. Thus the goal should be to distribute entitlement to food not the food itself. This might be achieved through a food stamp program or, using modern information technology, a system of smart cards that could be used to purchase food at local shops.

The third innovation of the strategy consists of monetization of food aid by private grain companies rather than by the NGOs. The grain companies can do this much more efficiently by selling the food in bulk in third markets and turning the proceeds over to the NGOs to be used for their maternal and child health care programs. This allows the NGOs to concentrate on what they are good at doing and takes advantage of the experience of the grain companies in international trade. Proceeds of the sale in foreign currency would be converted to local currency through the exchange market, which is increasingly the more desirable, non-inflationary way of obtaining counterpart funds.

Women's Education. One of the most effective ways of dealing with the problem of undernutrition is to increase the education, status, and control over resources of women within the household. This usually results in more food and health care being allocated to women and children, who are those most deprived. Education at the secondary school level has proven to be most effective. Thus the strategy calls for intervening in any way possible to increase the education and status of women. At one level, this could take the form of technical assistance in the revising of laws regarding inheritance, land tenure, property rights, labor, divorce, and other areas. At another, it could lead to programs to improve physical facilities for girls, to get more women involved in secondary school teaching, to assist in the payment of school fees, and other actions. In South Asia, there is a need for concerted action to offset the existing gender bias. In Sub-Saharan Africa, the problem is less one of gender bias and more that of insufficient resources to pay teachers and poor quality of education.

CONCLUSIONS

The analysis in this report has shown that if no additional action is taken, world undernutrition will increase in absolute terms by the year 2015. Yet there is a unique opportunity at the turn of the millennium for U.S. to exercise global leadership in meeting the Food Summit target of reducing the number of undernourished by more than one-half of the projected level. The report has also demonstrated that there is a viable and affordable strategy that exists for achieving this goal. The annual cost to all donors would be no more than \$45 billion, or 5 percent of the current level of official development assistance. A particular strategy for the U.S. to pursue is elaborated, with concentration on South Asia and Sub-Saharan Africa. This strategy draws upon the combined experience of U.S. farmers, agribusiness, NGOs, universities, foundations, and the U.S. government.

REFERENCES

Antoine, Pierre and Francis C. Byrnes. "Winrock's On-farm Productivity Enhancement Program (OFPEP): Experience and Lessons Learned in West Africa." Presented at Workshop 1993 Developing African Agriculture: New Initiatives for Institutional Co-operations. Cotonou, Bénin July 28-30, 1993.

FAO, The *Sixth* World Food Survey. Rome 1996

Haddad, Lawrence, John Hoddinott and Harold Alderman. *Intrahousehold Resource Allocation in Developing Countries: Models, Methods, and Policy*. IFPRI. The Johns Hopkins University Press. 1997.

Hazell, Peter and Shenggen Fan. "Balancing Regional Development Priorities to Achieve Sustainable and Equitable Agricultural Growth." Prepared for the AAEEA International Conference on Agriculture Intensification, Economic Development and the Environment. July 31-August 1 1998.

King, Elizabeth and M. Anne Hill. *Women's Education in Developing Countries: Barriers, Benefits and Policies*. The World Bank. Washington D.C. 1993.

Messer Ellen, Marc Cohen, and Jashinta D'Costa. *Food from Peace: Breaking the Links between Conflict and Hunger*. 2020 Vision. Food, Agriculture, and the Environment. Discussion Paper 24. IFPRI. 1998.

Pitt, Mark. "Women's Schooling, the Selectivity of Fertility, and child Mortality in Sub-Saharan Africa". Living Standards Measurement Study. Working Paper No 119. The World Bank. Washington D.C. 1995.

Rodgers, Beatrice Lorge and Nina P. Schlossman. *Intra-Household Resource Allocation: Issues and Methods for Development Policy and Planning*. United Nations University Press. 1990.

Rosegrant, Mark W., M. Agcaoili-Sombilla and N.D. Perez, 1995, *Global Food Projections for 2020, Implications for Investment*, Food, Agriculture and the Environment Discussion Paper, No. 5. IFPRI, Washington D.C. October, 1995.

Schnepf, D. Randall. "Nutritional Status of Rwandan Households: Survey Evidence on the Role of Household Consumption Behavior." *Working Paper 23*. Cornell Food and Nutrition Policy Program. 1992.

Schnepf, D. Randall. "Understanding the Health and Nutritional Status of the Children in Rwanda." *Monograph 13*. Cornell Food and Nutrition Policy Program. 1991.

Smith, Lisa and Lawrence Haddad. "Explaining Child Nutrition in Developing Countries: A Cross-Country Analysis". IFPRI. Washington D.C. Draft, April 1998.

World Development Indicators, 1998. The World Bank. Washington D.C.